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Selective Determination of Total Capsaicinoids in Plant Material Using Poly(Gallic Acid)-modified Electrode

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Abstract

© 2018 Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim Novel voltammetric approach for the selective determination of total capsaicinoids has been developed using glassy carbon electrode modified with multi-walled carbon nanotubes and poly(gallic acid) (PGA/MWNT/GCE). The modified electrode provides significant improvements in the capsaicinoids voltammetric characteristics in comparison to GCE and MWNT/GCE. The electrooxidation of capsaicinoids is irreversible adsorption-controlled process with the anodic transfer coefficient of 0.49–0.53 and heterogeneous electron transfer rate constant of 1300–2400 s−1. The analytical ranges of 0.010–1.0 and 1.0–50 μM for capsaicin, 0.025–0.75 and 0.75–75 μM for dihydrocapsaicin and 0.025–5.0 and 5.0–75 μM for nonivamide with the detection limits of 2.9, 5.9 and 6.1 nM, respectively, have been obtained using differential pulse voltammetry (DPV). The selectivity of the capsaicinoids quantification in the presence of ascorbic acid, α-tocopherol and carotenoids is shown. The method has been tested on the samples of red hot pepper spices and Capsicum annuum L. tinctures. The results correspond to the chromatographic data.

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Keywords

Capsaicinoids, Electropolymerization, Modified electrodes, Plant analysis, Voltammetry

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